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# *Information Bulletin*

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*Grade 6 Mathematics*  
*1994-98*

This document was written primarily for:

Students	✓
Teachers	✓
Administrators	✓
Parents	
General Audience	
Others	✓ Superintendents

This bulletin contains general information about the Achievement Testing Program and information specific to the Grade 6 Mathematics Assessment. Additional copies of the bulletin may be made as needed.

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**October 1994**

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# General Information

The Achievement Testing Program provides teachers, parents, students, school administrators, Alberta Education, and the public with information about what students know and can do in relation to provincial standards. Group results are reported at school, district, and provincial levels to improve learning opportunities for students.

The assessments are administered in two subject areas at Grade 3—language arts and mathematics—and in four subject areas at grades 6 and 9—language arts, mathematics, social studies, and science.

The assessments are based on provincial standards, which reflect important learnings in the subject areas listed above. Classroom teachers from across the province are extensively involved in developing and field testing the assessment instruments.

## Administering the Assessment

Information about the nature of the provincial assessments as well as their administration to special-needs students can be found in the *General Information Bulletin, Achievement Testing Program*, which has been mailed to all superintendents and principals.

## Schedule

The written-response component of English and French Language Arts must be administered during the first week of June. The machine-scorable component of all achievement tests must be administered during the last two weeks of June. Specific information regarding scheduling is provided in the current *General Information Bulletin*.

To minimize any risks to security, we recommend that all students complete the test on the same day. Students who are absent when the tests are administered and who return to school by the end of the school year must write the tests upon their return. By scheduling the tests early in the administration period, schools can ensure that most, if not all, absentees are tested. The principal is responsible for ensuring the security of the tests.

Beginning in 1995, the tests that will be administered each year are:

### Grade 3

English Language Arts (*Part A: Writing and Part B: Reading*)

Mathematics (English and French forms)

### Grade 6

English Language Arts (*Part A: Writing and Part B: Reading*)

Mathematics (English and French forms)

Social Studies (English and French forms)

Science (English and French forms)

Français 6<sup>e</sup> Année (*Partie A: Production écrite and Partie B: Lecture*)

### Grade 9

English Language Arts (*Part A: Writing and Part B: Reading*)

Mathematics (English and French forms)

Social Studies (English and French forms)

Science (English and French forms)

Français 9<sup>e</sup> Année (*Partie A: Production écrite and Partie B: Lecture*)

## Students in French Language Programs

Beginning in June 1995, all students in Francophone and French Immersion programs must write the French form of the achievement tests. Alberta Education will send enrollment forms to schools by February requesting an indication of how many English or French tests are required. These forms must be returned through jurisdiction offices by mid-March.

### ***Marking Achievement Tests Locally***

Beginning in June 1995, teachers will be able to mark the tests before returning them to Alberta Education. Teachers can use the results as part of an individual student's year-end assessment, as well as for planning instruction. Additional information regarding local marking of tests will be provided in December 1994.

### ***Reporting the Results***

Each school jurisdiction will receive a district report and school reports for their students' achievement, as well as guidelines for interpreting these results in relation to provincial standards.

To facilitate reflection on school programs, we expect that results will be shared with all school staffs (not just teachers of grades 3, 6, and 9), as well as with parents and the community.

Individual student profiles will be sent to the school that the student will attend in September. We also expect that these reports will be shared with parents.

Provincial results will be made public in September. A detailed *Achievement Testing Program Provincial Report* is published annually.

### ***Broadened Assessment Initiatives***

The Student Evaluation Branch has developed additional instruments to collect a broader base of information about what students know and can do than achievement tests themselves can provide. These instruments will be administered to a provincial sample of students in all subjects on a rotating basis:

#### **Grade 3**

- 1995 • "whole book" performance-based assessment in language arts
- 1996 • problem-solving activities in mathematics
- 1997 • "whole book" performance-based assessment in language arts
- 1998 • problem-solving activities in mathematics

#### **Grade 6**

- 1995 • problem-solving activities in mathematics
- 1996 • "whole book" performance-based assessment in language arts
- 1997 • problem-solving and decision-making activities in social studies
- 1998 • performance tasks in science

#### **Grade 9**

- 1995 • problem-solving and decision-making activities in social studies
- 1996 • problem-solving activities in mathematics
- 1997 • performance tasks in science
- 1998 • performance tasks in language arts

## ***Description of the Mathematics Assessment Standards***

The provincial standards are the basis upon which we assess how well students have learned mathematics by the end of Grade 6. These standards reflect the essential learnings that all Alberta students are expected to achieve. Provincial standards are useful, therefore, for assessing Grade 6 students in all types of school programs—public, private, and home education.

### ***Purpose of Assessment Standards***

These statements describe what is expected of Grade 6 students who are meeting the *acceptable standard* or the *standard of excellence* on independent work at the end of the Grade 6 Mathematics program. The

statements represent the standards against which student achievement will be measured. By comparing actual results to provincial standards, decisions can be made about whether achievement is in fact “good enough.”

### *Acceptable Standard*

Students who meet the *acceptable standard* in Grade 6 Mathematics are expected to have a basic understanding of mathematical concepts and related procedural knowledge. They are expected to be able to demonstrate their understanding in concrete, pictorial, and symbolic modes and be able to translate from one mode to another. For example, students meeting the *acceptable standard* should know that the solution to the number sentence  $42 \times 2 = \square$  is 84 and be able to demonstrate their understanding in concrete and pictorial ways. They are able to write related number sentences and verify them using manipulatives and diagrams.

To meet the *acceptable standard*, students are expected to communicate about mathematical situations in an understandable way using objects, diagrams, and appropriate everyday and mathematical terms. They are expected to understand mathematical questions presented with objects, diagrams, or symbols in everyday and school contexts.

Students meeting the *acceptable standard* are expected to perform the mathematical operations and procedures that are fundamental to mathematics in Grade 6 and apply what they know in solving routine problems in familiar settings. They are able to describe the steps they used to solve a particular problem and to defend their solution to the problem.

The expectation is that students meeting the *acceptable standard* have a positive attitude about mathematics and a sense of personal competence in using mathematics in their daily lives. They are able to demonstrate

confidence when using common mathematical procedures and when applying problem-solving strategies in familiar settings.

### *Standard of Excellence*

Students who meet the *standard of excellence* in Grade 6 Mathematics are expected to have a superior understanding of mathematical concepts and related procedural knowledge. They are consistently able to demonstrate their understanding in concrete, pictorial, and symbolic modes, and easily translate from one mode to another. They are able to create problem situations to illustrate concepts and to analyze and explain relationships among concepts. For example, students meeting the standard of excellence should be able to write all number sentences related to  $42 \times 2 = \square$ , justify them using manipulatives and diagrams, and create problem situations to exemplify the relationship. They should be able to compare the set of related sentences with sentences showing other operations on the numbers.

To meet the *standard of excellence*, students are expected to verbalize and write about mathematical situations clearly, using correct technical terms. They are expected to understand mathematical questions presented with objects, diagrams, or symbols in common and unusual contexts.

Students meeting the *standard of excellence* are expected to perform the mathematical operations and procedures that are fundamental to mathematics in Grade 6 and to be able to apply what they know in solving and creating novel problems. They are able to clearly describe the steps that they or other students used to solve a particular problem and can suggest alternative procedures and/or solutions.

Students meeting the *standard of excellence* should have a positive attitude toward

mathematics and show confidence in performing mathematical tasks. They are expected to be self-motivated risk-takers who persevere when solving novel problems. They take initiative in trying new methods and are creative in their approach to problem solving.

## ***Grade 6 Mathematics Assessment***

### ***General Description***

The Grade 6 Mathematics Assessment consists of four components:

- Machine-scorable component*—completed by all Grade 6 students in the province
- Timed computation tests*—completed by a provincial sample of Grade 6 students
- Performance-based component*—completed by a provincial sample of Grade 6 students
- Learning Contexts Survey*—completed by a provincial sample of Grade 6 teachers and students.

In 1996, 1997, and 1998, only the machine-scorable component will be administered.

### ***Machine-Scorable Component***

The machine-scorable component consists of 50 questions integrated in narrative themes. Students should be given ample time to complete the questions. The assessment is designed to be completed in 60 minutes. However, additional time of approximately 30 minutes may be provided to allow students to finish.

The blueprint for the machine-scorable component is on page 5 of this bulletin, followed by sample questions, beginning on page 7, that teachers can use with students to help them prepare for the provincial assessment.

Students will record answers to questions on the answer sheet provided (see page 16 for practice answer sheet).

Students will require HB pencils, rulers, and erasers. They will also need scrap paper.

Students may use manipulative materials and calculators when completing the machine-scorable component.

### ***Reporting Categories Indicators***

The following points briefly highlight the learnings for each reporting category.

#### ***Knowledge and Skills***

- recalls facts, concepts, terminology
- knows number facts
- recognizes place value
- performs algorithms, computations
- performs constructions, measurements
- uses calculators, computers
- knows mental computation, estimation strategies

#### ***Application and Problem Solving***

- demonstrates conceptual understanding by:
  - representing basic mathematical concepts in concrete, pictorial, and /or symbolic modes
  - applying a mathematical concept in familiar situations
  - creating new problem situations that exemplify a concept
  - judging reasonableness of answers
  - justifying answers
  - communicating why and when certain strategies are appropriate
- understands basic mathematical concepts
- understands relationships among numbers, operations, number forms, and modes of representation
- understands relationships among geometric forms
- understands the problem-solving process
- uses a variety of strategies
- applies mathematical concepts to new situations

## ***Blueprint***

<b>Strands</b>	<b>Reporting Categories</b>		<b>Total Number of Questions</b>
	<b>Knowledge and Skills</b>	<b>Application and Problem Solving</b>	
<b>Numeration</b>	5	7	12
<b>Operations and Properties</b>	3	11	14
<b>Measurement</b>	2	5	7
<b>Geometry</b>	3	6	9
<b>Graphing</b>	3	5	8
<b>Total Number of Questions</b>	16	34	50

### ***Timed Computation Test***

In 1995, a provincial sample of Grade 6 students will be selected to participate in the timed computation test. This test consists of five timed tests of computation in addition, subtraction, multiplication, division, and mixed operations.

### ***Performance-Based Component***

Performance-based assessment provides students with real-life problem-solving activities. This assessment addresses the learner expectations that cannot be easily measured using only paper-and-pencil strategies. In 1995, a provincial sample of Grade 6 students from across the province will be selected to participate in the activity-based assessment. The problem-solving and writing activities involved in the assessment have been developed by teachers and are designed to model good classroom instruction and assessment methods.

### ***Learning Contexts Survey***

In 1995, learning context survey questionnaires will be given to a provincial sample of Grade 6 teachers and students.

The purpose of the student questionnaire is to examine the extent to which important math attitudes are evident, to look at student attitudes toward mathematics, and to correlate these attitudes with achievement.

The purpose of the teacher questionnaire is to study the effect on student achievement of classroom environment, instructional strategies, approaches to problem solving, and use of manipulative materials.

### ***Confirming Standards***

Confirming standards is a process whereby judgements about students' performance on the assessment are made in relation to provincial standards. For more information on confirming standards procedures, refer to Appendix A of the *Achievement Testing Program Provincial Report, June 1993 Administration*. For information on the selection of teachers for participation in the confirming standards process, refer to the current *Achievement Testing Program General Information Bulletin*.

# Preparing Students for the Assessment

We hope that teachers will share the following information with their students to help them prepare for the mathematics assessment.

*I strongly advocate preparing children to understand tests and testing through extensive class discussion about the makeup of the test and how to take it, and then adequate practice to find out their own particular weaknesses in approaching tests.*

—Graves, p. 183

## Suggestions for Answering Multiple-Choice Questions

The following suggestions are provided to help prepare students for Section 1 of the Grade 6 Mathematics machine-scorable component.

- The questions in the assessment are integrated into narrative themes.
- Use the information given by:
  - a. looking at all the information and thinking carefully about it before you try to answer the questions; or
  - b. reading the questions first and then looking at the information, remembering the questions you need to answer.
- When you are given information for more than one question, remember to *go back to the information before answering each question.*

- Make sure you look at all forms of the information given.* Information may be given in words, charts, pictures, graphs, and maps.

- Check your work when you calculate an answer, even when your answer is one of the choices.*

- When answering questions, *choose the answer you think is best.* If you don't see a correct or best answer right away, try to find the two choices that seem closest to the correct answer and pick one of them for the answer.

## Suggestions for Teachers Administering the Assessment Example

Familiarize your students with the format of the machine-scorable component of the assessment and the kinds of questions that will appear on it by having them work through the assessment example. A practice answer sheet is provided.

Establish an environment suitable for test taking and allow students to complete the assessment example, recording answers on the practice answer sheet.

When the assessment example is completed and marked, discuss with the class the time needed to do the work and the accuracy of the work, and address any specific concerns raised by students.

This collection of questions does not represent the test emphasis as presented in the blueprint.

## Our Trip to the Festival

The Marston Junior Community Band is going on a trip to compete in the Downsview Music Festival. The band will enjoy various activities in Downsview after the competition. They planned their activities and set up a budget. They held fund-raising projects to earn money to pay for the trip.



A great deal of planning and fund-raising had to be done to prepare for the band's trip. The first six questions are about these activities.

*Use the following information to answer questions 1 to 3.*

Before planning their fund-raising activities, the band drew up this budget.

Budget	
Expense	Cost
Bus	\$3698.76
Food	\$5126.00
Motel	\$2453.00
Festival Fee	\$150.49
Emergency Money	\$200.00

- The costs of the trip in order from **least** to **greatest** are
  - festival fee, emergency money, motel, bus, food
  - food, bus, motel, emergency money, festival fee
  - bus, motel, food, festival fee, emergency money
  - emergency money, festival fee, motel, food, bus
- The total cost of the trip is
  - \$10 627.76
  - \$11 628.25
  - \$12 977.76
  - \$14 779.88
- How much more money will the group need for food than for the combined expenses of motel and emergency money?
  - \$2653.00
  - \$2473.00
  - \$1873.00
  - \$1428.00

4. The band has allocated \$5126.00 for food. There are 64 people going on the trip.

Which equation tells how much food money each person on the trip has?


- A.  $\$5126.00 \div 64 = \square$   
B.  $\$5126.00 \times 64 = \square$   
C.  $\$5126.00 - 64 = \square$   
D.  $\$5126.00 + 64 = \square$

5. When Bud finished counting the money raised for the trip, he wrote the total amount like this:

$$(1 \times 100) + (9 \times 1000) + (2 \times 10) + (8 \times 0.1) + (5 \times 1)$$

How much money does he count?

- A. \$1902.85  
B. \$1982.50  
C. \$9128.05  
D. \$9125.80
6. When the fund-raising was complete, this cheque was written to pay for the bus.

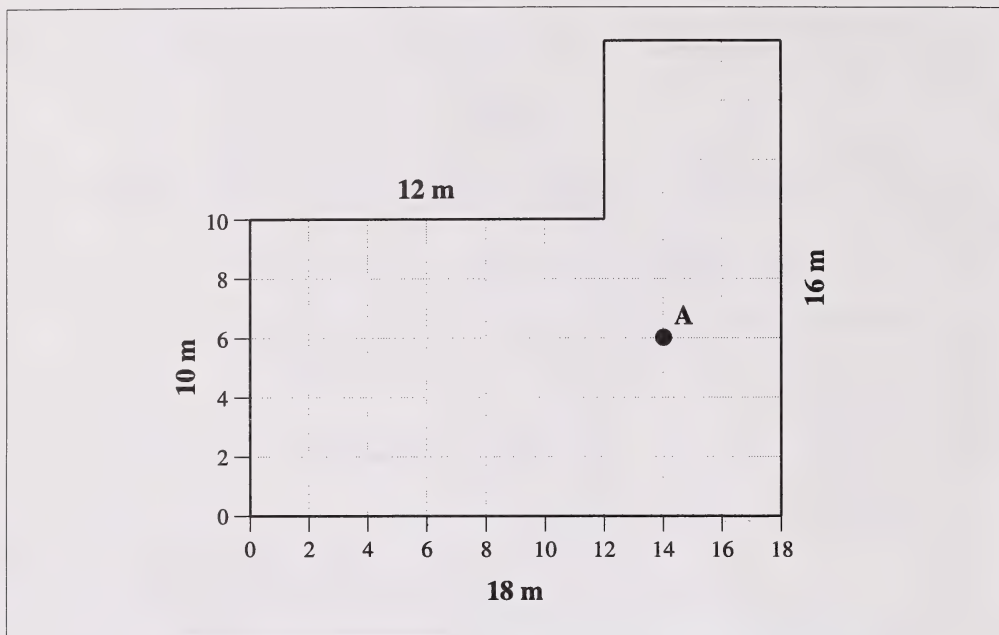
<b>Marston Community Band</b> 110 - 50th Street Marston, Alberta T5H 0Y0		200
Pay to _____ <i>Super Bus Lines</i> _____		19 _____
the order of _____		\$3,698.76
Amount _____		
	<b>Bank of Marston</b> 400 Main Street Marston, Alberta T5H 0Y0	
Authorized Signatures _____		
• 200 • :044189•••003::846••• 855•••7••		

The amount of \$3698.76 is written as

- A. three thousand and six ninety-eight dollars and seventy-six cents  
B. three thousand sixty-nine hundred eight dollars and seventy-six cents  
C. three thousand six hundred eighty-nine dollars and seventy-six cents  
D. three thousand six hundred ninety-eight dollars and seventy-six cents


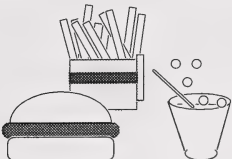
The band stayed at the Restful Motel. The next three questions are about their activities on the first evening.

Use the following diagram to answer questions 7 and 8.



7. The band members walked around the perimeter of the pool. How far did they walk?
- A. 62 m
  - B. 68 m
  - C. 180 m
  - D. 280 m
8. Haley was in the pool at point A. Which ordered pair describes her position in the pool?
- A. (14, 6)
  - B. (6, 14)
  - C. (16, 8)
  - D. (8, 16)

Use the following menu to answer question 9

<b>BURGERS</b>	<b>SIDE ORDERS</b>	<b>DRINKS</b>
Single Burger \$2.25	French Fries \$1.75	Cola \$1.50
Double Burger \$3.25	Hash Browns \$1.75	Orange Juice \$1.25
		Hot Chocolate \$1.50
<div><b>Please come again!</b> prices include tax</div>		

9. After their swim, the band walked to Downsview Diner for supper. Bert ordered a double burger, a single burger, two colas, and one order of french fries. How much change should he get back from a twenty-dollar bill?
- A. \$6.50  
B. \$9.75  
C. \$10.25  
D. \$13.50

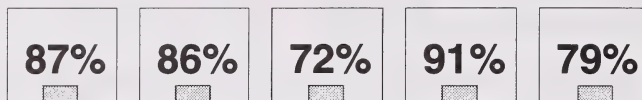
The following morning, the band competed in the festival. The next three questions are about their day.

10. There were 18 bands in the festival. Each band had an average of 65 members. What is the **least** number of chairs needed to seat all the band members?
- A. 1030  
B. 1170  
C. 1260  
D. 1300

11. Each band played for 8 minutes during the festival. What is the playing time for 18 bands?

- A. 1 h 40 min
- B. 2 h 24 min
- C. 2 h 40 min
- D. 14 h 40 min

12. The judges at the festival awarded Marston Junior Community Band these scores:



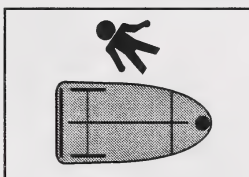
What is their average score?

- A. 72%
- B. 79%
- C. 83%
- D. 91%

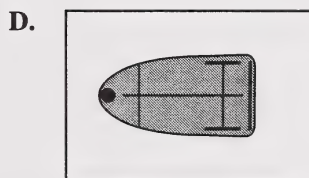
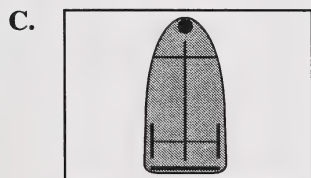
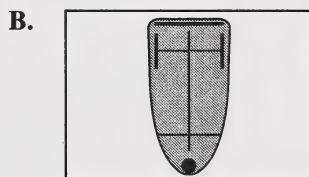
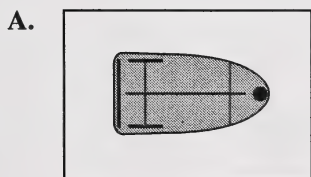
On the third day, the band went to an amusement park before returning to Marston. The next five questions are about activities at the park and on the bus.

*Use the following information to answer question 13.*

Robbie was making a videotape of Phil on the waterslide. When Phil was thrown from the slide board, Robbie continued to film the board.



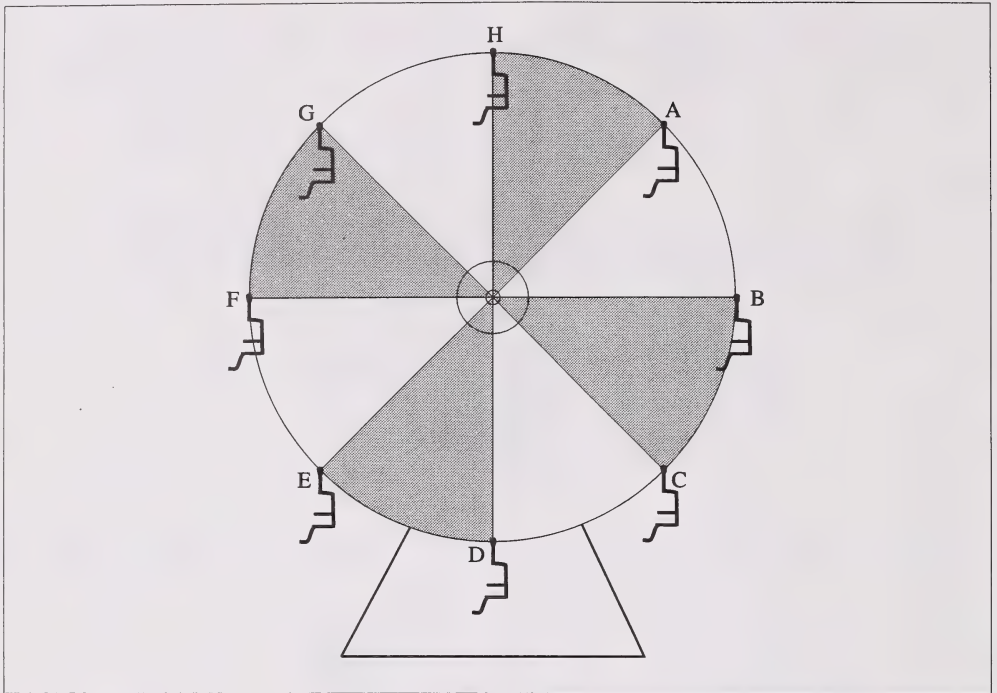
13. Which of the pictures shows the next frame in Robbie's video if the board turns  $90^\circ$  clockwise?



14. The band members who went on the waterslides found that the length of the shortest waterslide was  $10\text{ m} + 5\text{ dm} + 6\text{ cm}$ . What is the total length in centimetres of this waterslide?

- A. 21 cm  
B. 156 cm  
C. 210 cm  
D. 1056 cm

Use the following diagram of a Ferris wheel to answer questions 15 and 16.



15. Which fraction shows the shaded part of the Ferris wheel expressed in lowest terms?

- A.  $\frac{4}{5}$
- B.  $\frac{1}{2}$
- C.  $\frac{3}{4}$
- D.  $\frac{5}{8}$

16. The angle made from point G to the center (O) and then to point H is

- A. an acute angle
- B. an obtuse angle
- C. a straight angle
- D. a right angle

## Key and Descriptors

Ques. No.	Key	Program Strand*	Reporting Category**	Curriculum Standard	Examples of Assessment Standard***
1	A	N	K	Order decimal numbers from least to greatest.	A
2	B	OP	K	Add five 6-digit numbers.	A
3	B	Gr	K	Find data in a table and calculate the answer.	A
4	A	OP	K	Know the divisor of a division question.	A
5	D	N	P	Convert unordered expanded notation to standard notation.	E
6	D	N	K	Write a 6-digit number with a decimal in words.	A
7	B	M	P	Apply an understanding of perimeter and fill in missing elements to calculate the perimeter.	E
8	A	Gr	P	Communicate the position on a grid with an ordered pair.	A
9	B	OP	P	Solve a two-step problem by adding costs and calculating change.	A
10	B	OP	K	Multiply 2-digit numbers.	A
11	B	M	P	Solve the problem and convert the answer to hours and minutes.	E
12	C	OP	P	Understand and calculate average.	A
13	B	G	P	Predict an image after a turn.	A
14	D	M	P	Convert measurements to cm and add.	E
15	B	N	K	Recognize 4 parts shaded out of 8 parts as $\frac{1}{2}$ . (Fraction is in lowest terms.)	A
16	A	G	K	Name the angle as acute.	A

\* N—Numeration, OP—Operations and Properties, Gr—Graphing, M—Measurement, G—Geometry

\*\* K—Knowledge and Skills, P—Application and Problem Solving

\*\*\* A—Students meeting the acceptable standard should be able to correctly answer questions such as these.

E—In addition to answering the questions identified for the acceptable standard, students meeting the standard of excellence should be able to correctly answer questions such as these.

*Practice Answer Sheet for Assessment Example*

**MULTIPLE CHOICE**

1 (A) (B) (C) (D)

2 (A) (B) (C) (D)

3 (A) (B) (C) (D)

4 (A) (B) (C) (D)

5 (A) (B) (C) (D)

6 (A) (B) (C) (D)

7 (A) (B) (C) (D)

8 (A) (B) (C) (D)

9 (A) (B) (C) (D)

10 (A) (B) (C) (D)

11 (A) (B) (C) (D)

12 (A) (B) (C) (D)

13 (A) (B) (C) (D)

14 (A) (B) (C) (D)

15 (A) (B) (C) (D)

16 (A) (B) (C) (D)

## ***Credit***

Donald H. Graves, *Build a Literate Classroom* (Toronto: Irwin Publishing, 1991), p. 183.

## ***Alberta Education Contact***

Questions or comments regarding this bulletin should be directed to:

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